BULLETIN 910

Controlling

WEEDS and ALGAE

in Farm Ponds

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Controlling WEEDS and ALGAE in FARM PONDS

Wilson F. Clark

REQUESTS frequently are made to the College of Agriculture for information on controlling weeds and "scums" in farm ponds. Unfortunately little work has been done to solve this problem in New York State, but research is now in progress and considerable information is available from other States. Recommendations given here are based on Bulletin 425, *Weed Control in Small Ponds,* by the Virginia Agricultural Experiment Station, at Blacksburg, Virgina, and on the Fish and Wildlife Service Fisheries Leaflet 344, *Control of Aquatic Plants in Ponds and Lakes.* Both were issued in 1949. Where New York State research has indicated the necessity of changes in these recommendations, such changes have been made.

Why Control Pond Weeds

Farm ponds choked with weeds or containing heavy blankets of algae, erroneously called *scum* or *frog spit,* are of little value to the owner. Stock water is less palatable, swimming is unpleasant, fishing is apt to be poor, and management of the pond for fish production is more difficult. In addition, decaying masses of plants, particularly algae, not only create a foul odor but may kill fish by using up the oxygen in the water. For these reasons you may need to control weeds in your pond. It must be recognized that farm *marsh* management is much different from farm *pond* management, and the weed-control suggestions in this bulletin apply only to farm ponds.

Weeds in farm ponds are not always harmful. In some ponds, particularly those that are shallow or those in which the water level has been lowered, weeds may shade the water and thus help to keep the water temperature low. In trout ponds, water temperature is important. Even though the dissolved oxygen in the water may be enough for trout, high temperature alone can be fatal. Since weeds in ponds are sometimes useful, you must consider depth of water, temperature, expected water use, and time of year in deciding whether or not to remove the weeds.

Kinds of Plants in Ponds

Three general groups of water plants occasionally give trouble in farm ponds: (1) submerged rooted plants, those that grow entirely below the water; (2) emergent rooted plants, those that grow in the pond bottom but have leaves floating on the surface or growing upward above the water; and (3) algae. The algae appear as scums or floating mats made up of fine hair-like strands. They do not have roots or leaves. Each group usually requires a different control method. In your own pond, check to see which group of plants is the main problem before you decide on the control treatment.

It often has been said that "a weed is any plant that is out of place." In many farm marshes it is advisable to encourage the growth of such plants as cattails and rushes, to serve as food for muskrats, and to encourage such duck food as wild rice and smartweed. In farm ponds, however, these and other plants, particularly if they become abundant, create pond-management problems and may make the ponds less useful.

How to Control Weeds and Algae

It must be clearly understood that *there is no method known at present to control pond weeds and algae permanently.* The control methods described here are at best temporary and may or may not solve your control problem. Pond conditions vary so widely that

A weed-free pond is an asset to any farm

no assurance of success can be given. You can use what seems to be the best method for your pond and hope that it works.

Pond construction

In properly constructed ponds with only a small proportion of the water area less than 2 foot deep, rooted weeds are less likely to become established. In ponds with large areas of shallow water, both weeds and algae may become established quickly. Large ponds, or ponds with water flowing through them constantly, present more difficult weed and algae control problems than small or still-water ponds. Fertilizing or applying chemicals to ponds with a fairly large amount of water flowing through them is an expensive, wasteful, and often ineffective practice.

Fertilizing

Heavy fertilization of pond waters *sometimes* helps to control both the submergent and emergent weeds, by causing the growth of tiny free-floating plants called *plankton*. These tiny plants which give the water a color varying from brown to green, decrease the amount of sunlight that reaches the bottom of the pond. This in

turn decreases the ease of establishment and the rate of growth of rooted pond weeds.

As far as algae are concerned, the addition of a fertilizer may sometimes control and sometimes actually stimulate the growth of the algae. If you add a fertilizer early in the spring so a heavy growth of plankton is present throughout the summer, algae may not appear at all but this is exceptional. Usually at least some algae do appear, and chemical control will have to be applied.

In neither trout ponds nor warm-water ponds of New York State does there appear to be any clear-cut relationship between abundance of algae and abundance of plankton resulting from fertilization. Algae are often as abundant (and sometimes more abundant) in fertilized ponds as in unfertilized ponds.

Fertilization, then, may help to control pond weeds, but should not be counted on to control algae.

Physical control

Sometmes weeds in a pond can best be controlled by actually pulling them out or by repeatedly cutting them off. If you do this when the weeds first appear, and if you do not allow weeds to spread, it may not be too difficult to control their growth. If a heavy growth of algae develops, rake or drag the mats of algae up on the shore, which removes a lot of it, and then apply chemicals to the pond.

Chemical control

An application of certain chemicals to ponds may temporarily control weeds and algae. Occasionally a pond owner finds dead fish after he has treated his pond. This may be due to too concentrated a solution of the chemical, but it is just as likely that the fish died from lack of oxygen in the water. Oxygen depletion may result from the decaying of the weeds or algae killed by the chemical treatment. Where fish are an important consideration, thoroughly flush the pond after the plants start to decay, if possible. Many ponds are fed by runoff water alone and cannot be flushed. Then it may be necessary to treat such ponds chemically a section at a time.

How to Calculate the Amount of Chemical Needed

It is necessary before applying chemicals to know:

1. The concentration of a particular chemical that is needed to kill certain plants and yet not to kill the fish.
2. The total amount (weight) of water in the pond.

Concentration of the chemicals is discussed under individual chemicals (page 10). Killing concentrations are expressed as *parts per million* by weight (abbreviated *ppm*). Ths means that if a certain chemical must be at a concentration of 2 parts per million (2 ppm). then 2 pounds of the chemical must be added for *each* million *pounds* of water in the pond.

The total weight of water in the pond may be found in several ways. If your pond was designed by and built under the technical supervision of the Soil Conservation District engineer, then he can tell you the surface area of the pond and the number of gallons of water the pond holds when filled to the top of the trickle tube. This number of gallons times 8.3 (the weight of 1 gallon of water) gives the total weight of water in the pond.

If you do not know the volume of water in the pond, you must first carefuly estimate the surface area of the pond (¼ acre is approximately 104 feet by 104 feet).

Then

Area in acres x 43,560 square feet per acre = area in square feet

and

Area in square feet x average depth in feet = volume in cubic feet

To get the *weight* of water, multiply this volume times the weight of 1 cubic foot of water (62.5 pounds).

Volume in cubic feet x weight of 1 cubic foot = total weight

The average depth may be found by making soundings in many different parts of the pond, and averaging them.

Many manufcturers of weed-killing chemicals market them in diluted form; that is, they do not sell the pure chemical. Some are sold as dusts, some in water solution, and some in oil-base solution. It is absolutely necessary that you know the actual percentage of pure chemical weed killer in the product you buy. This percentage should be given on the label of the container.

If you purchase sodium arsenite, for example, the label might state:

23% by weight—sodium arsenite
77% by weight—water and other materials

This would mean that for each pound of the commercial product, you would be getting 0.23 pounds of pure chemical; or, in order to buy 1 pound of pure chemical, you would have to buy:

$$\frac{100}{23} = 4.3 \text{ pounds of the commercial product}$$

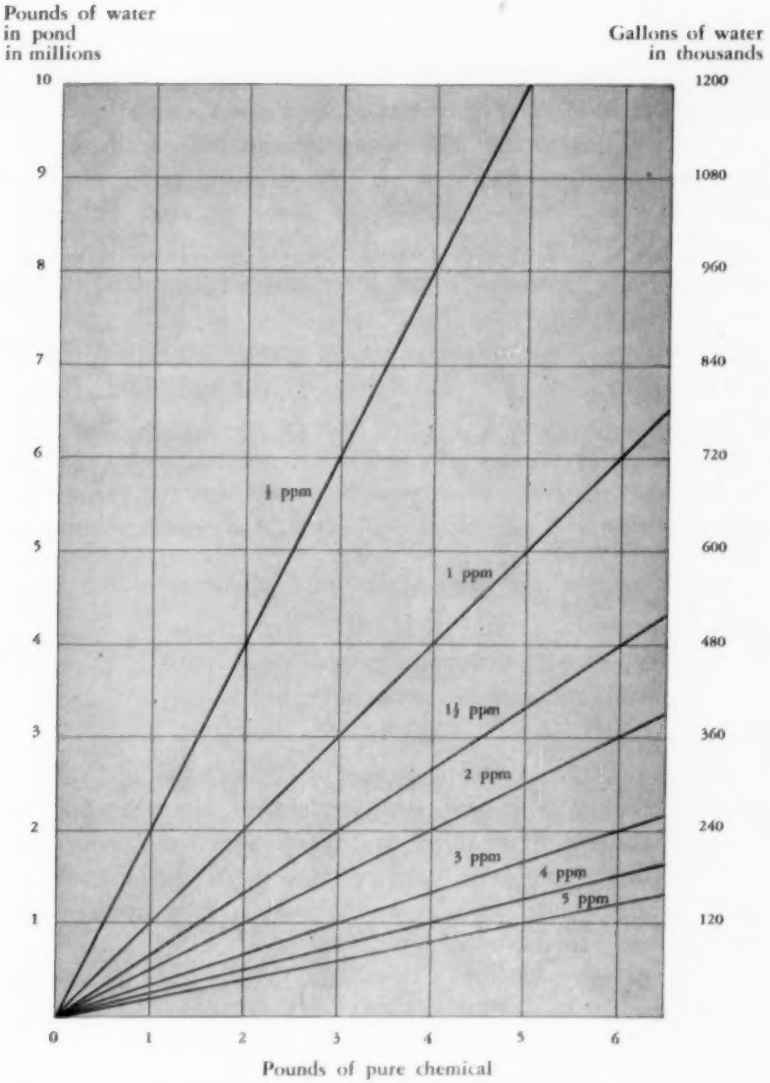
To continue this example further, if your pond contained 6 million pounds of water, and you needed a concentration of 3 ppm. of sodium arsenite to kill the weeds, then you would need 3 pounds of pure chemical for each million pounds of water. Therefore, the total amount of pure chemical needed would be 6 x 3 = 18 pounds. But to get 1 pound of pure chemical it is necessary to buy 4.3 pounds of commercial product. The total amount of commercial product then is:

18 x 4.3 = 77.4 pounds of commercial product

Please do not make the mistake of applying these simple calculations to your pond. The calculations for each pond, for each concentration, and for each chemical will be different, so it is necessary for each pond owner to make his own calculations.

A helpful graph

The graph on page 9 will help you find the weight of pure chemical to use to give certain concentrations of poisons (in parts per million), according to the number of gallons or number of pounds of water in the pond. To use the graph, you must know either the number of gallons or the number of pounds of water in the pond. Then you must decide what concentration of poison you should use. (Refer to the directions under each kind of chemical, pages 10 to 14). On the graph find the point where the number of gallons (or pounds) you have and the diagonal line for your specific concentration meet. From this point, follow down to the scale at the bottom of the graph. This point is the weight of pure chemical needed for your situation. The graph does not cover all possible situations however, and it may be necessary for you to calculate the weight of chemical for your pond.



How to calculate concentrations

The Chemicals

Many chemicals have been used to control weeds and algae in ponds and lakes. In choosing which chemicals to include in this bulletin, the following requirements were considered: cheapness and availability, ease and effectiveness of application, and safeness for fish when properly used. The three chemicals discussed here meet all of these requirements.

Chemical	*Effective on*	*Concentration*	*How Applied*
Sodium arsenite	Submerged rooted plants	3 to 4 ppm	Water spray
Copper sulfate	Algae only ("scums" or "frog spit")	½ ppm	Water spray
2,4-D	Emergent rooted plants	5% to 10%	Kerosene or water

Sodium arsenite

Used for

Sodium arsenite is effective against most submerged rooted plants.

Concentration

A concentration of 3 to 4 ppm is usually satisfactory. If the pond water is "hard," increase the concentration to 5 to 6 ppm.

How to apply

Mix the calculated weight of chemical with water and spray it on the surface of the pond, particularly above the weed beds. It makes no difference how dilute your spray solution is, provided you apply all of the calculated weight of chemical to the pond. If the pond is heavily infested with weeds, spray it in sections. Allow enough time between sprayings for the weeds to decompose. To find whether it is safe to spray the next section, rake up some of the killed weeds in the last section sprayed. If they are broken down and decomposed into fairly small pieces, then it is safe to spray the next section. It may take a week or more to produce this amount of decomposition. If you kill all the weeds at once in a heavily weeded pond, instead of spraying one section at a time, the supply

of oxygen may be so depleted that the fish suffer or die. Sectional spraying prevents this.

Precautions

Sodium arsenite is a *dangerous poison.* Use rubber gloves and wear hip boots when you use it. Be careful that none of the chemical gets on your hands or face, as it can cause severe burns. If possible, lower the water level of the pond before you start to spray, so that no water can escape through the overflow for about a week. Be sure that the poison dosage is calculated on the basis of the volume of the water left in the pond.

Fence cattle away from a pond sprayed with sodium arsenite, since they might eat shore plants on which some of the chemical has been spilled. Even though a concentration of 3 ppm normally will not harm cattle or fish, the possibility of severe poisoning is present, so precautions are necessary. Let your neighbors know when you are going to spray, so that they realize poisons are in use. In addition, do not use the pond for swimming or for stock water for at least a week after spraying.

Copper sulfate

Used for

Copper sulfate is effective against algae only. It does not control rooted water plants.

Concentration

Use copper sulfate at a concentration of $\frac{1}{2}$ ppm. A concentration of 1 ppm may kill fish. Repeated applications of $\frac{1}{2}$ ppm are much safer than a single application of a strong concentration.

When to apply

Apply copper sulfate when algae first appear in the shallow-water areas of the pond. This may be rather early in the spring. It is much easier to make repeated applications to prevent the formation of thick mats of algae than to apply late control measures.

How to apply

To apply copper sulfate, dissolve the calculated weight of pure copper sulfate in water and spray it on the pond. A readily soluble

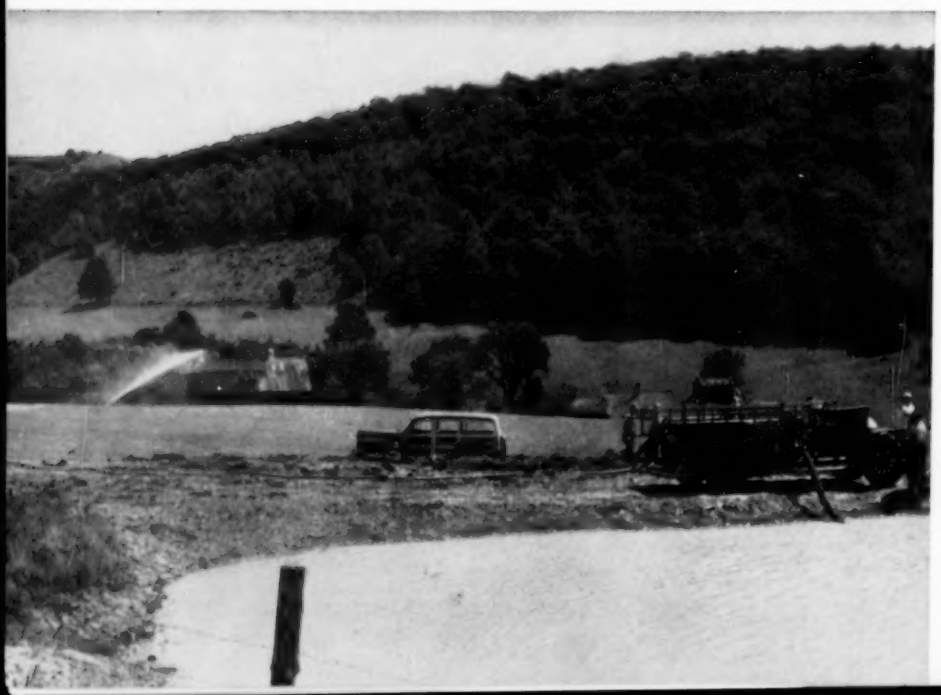
form of the chemical, called *copper sulfate snow,* is sold by some farm-supply stores. Larger copper sulfate crystals are must more difficult to dissolve.

In certain parts of New York State the control of algae with copper sulfate snow has been widely and quite successfully used. In fact, the Allegany County Soil Conservation District offers an algae control service to its cooperators. In using the copper sulfate snow solution, direct the spray on the algae. Choose a warm, sunny and windy day, so that the algae will be at or near the surface and close to one shore of the pond. It is also possible to broadcast the dry copper sulfate snow directly on the pond; but if this is done, be sure to wear goggles and a respirator. Since the solution is easier and safer to use, broadcasting the dry chemical is *not* recommended.

Precautions

Copper sulfate is not particularly dangerous to handle, but it is always wise to avoid continued contact wih such chemicals. Do not breathe the spray or dry chemical, and protect your eyes while using this material.

Weed-free water is available for fire protection



Weed-killer 2,4-D (*this is not DDT*)

Used for

Effective against water plants that stick up out of the water, or that have leaves floating on the water. Repeated applications of strong concentrations are needed to control cattails and water lilies.

Concentration

You can control most emergent water plants by a 5 *per cent* (not ppm) spray, with kerosene as a carrier. Concentrations of $7\frac{1}{2}$ to 10 per cent are often required if a water spray is used.

How to apply

Since 2,4-D is sprayed *directly* on the plants, you do not have to consider the total volume or weight of water in the pond. In this case, the actual concentration of chemical in the spray is what counts.

How to determine amounts

2,4-D is sold in several forms, but the important thing to know is the concentration of 2,4-D expressed in what is called the *acid equivalent percentage* by weight. This information should be on the label. Do not buy a brand of 2,4-D that does not give this information. To figure how to make the concentration of spray required, you need to know:

1. The percentage of acid equivalent by weight in the commercial product you buy.

2. The final percentage concentration needed in the spray.

For example, suppose you buy a brand of 2,4-D that states that it contains 20% acid equivalent by weight of 2,4-D in each gallon of that brand. Also, suppose that you want a spray containing only 5% acid equivalent by weight. Then:

$$\frac{20\% \text{ in commercial product}}{5\% \text{ desired}} = 4$$

Thus 1 gallon of 20% commercial product will be strong enough to make 4 gallons of 5% spray. All you need to do is to pour the gallon of commercial 2,4-D into a barrel, then pour in *3 gallons* of water or kerosene.

Weeds and algae may clog irrigation equipment

Here's another example: Suppose you buy 30% acid equivalent 2,4-D, and you need a 7% spray. Then:

$$\frac{30\% \text{ in commercial product}}{7\% \text{ desired}} = 4.3$$

This shows that to 1 gallon of this commercial product must be added 3.3 gallons of water or kerosene to make a final amount of 4.3 gallons of 7% spray.

Kerosene sprays of 2,4-D seem to be more effective than water sprays in controlling pond weeds. 2,4-D can be bought as an ester or amine. Either can be used, but the ester form is usually more effective.

Precautions

No particular precautions other than common sense are required for the safety of persons using 2,4-D. It is necessary, however, never to use for other sprays on farm crops a sprayer that has had 2,4-D in it. Enough 2,4-D remains in the sprayer to harm those crops. In spraying 2,4-D, be careful that the spray does not drift or is not blown onto nearby crops. Spray on a still day if possible.

Both cattails and water lilies are hard to control by spraying, unless you make repeated applications of 10% 2,4-D sprays in kero-

sene. Pulling and cutting these plants as they develop is often the cheapest control method.

Legal Responsibilities

A person poisoning the weeds or algae in his pond should realize his legal responsibility to confine the poisoned waters to his pond. If treated water flows into any other private or public waters and kills any fish, the pond owner may be liable under paragraphs 1 and 3 of Section 213 of the Conservation Law.

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